should be relied upon to protect consumers. Basket 4 would also include discretionary services, as described earlier.

Basket 3, emerging competitive services, would include services that face some competition, but do not yet meet the conditions for streamlined regulation. Basket 2 would include services that face no competition.

The regulated firm should be allowed substantial pricing flexibility in both Baskets 2 and 3. Since the baskets are separate, there is no danger of using noncompetitive services to subsidize emerging competitive or competitive services. There is no danger that emerging competitive services can be used to subsidize competitive services.[79]

The general principle is that markets should be separated, based on the extent of competition and/or whether the services are discretionary. Then, pricing flexibility can be afforded to *all* services (except Basket 1) — not just the more competitive services. Pricing flexibility leads to more efficient pricing even for noncompetitive services — once the dangers of cross-subsidy or a vertical price squeeze are averted through the use of separate baskets and maintenance of efficient price spreads

To implement this basket structure effectively, one needs to substantially disaggregate services across markets. Some services will face competition only in selected geographic areas. Ideally, the service should be deemed competitive or emerging competitive only in geographic areas where competition actually exists. In other areas the service would be deemed noncompetitive. Since competition is growing so rapidly, the services to be included in each basket should be reviewed every year. Over time, more and more services would be assigned to the emerging competitive and competitive baskets, as competitors enter new markets and grow in their existing markets. Each year, the companies should be given a chance to disaggregate services; so some markets for a service (e.g., the service in particular geographic areas) can be placed in the competitive basket.

[79]In formal economic terms, cross-subsidy occurs when some services are priced above stand-alone costs, while other services are priced below incremental costs. The former services subsidize the latter. If under the initial rates, neither basket subsidizes the other, the basket constraints prevent the firm from restructuring rates so that one basket subsidizes the other. Basket constraints also preclude many types of price-restructuring that do not involve cross-subsidy

VI. CONCLUSIONS

In recent years, many regulators have realized that rate-of-return regulation is wholly inappropriate for the telecommunications industry. A different approach is needed, as the industry enters the Information Age. The FCC and state regulators have tried many different versions of regulatory reform. Results have generally been successful. Incentive regulation has been an appropriate step in the right direction. Further steps in the same direction could yield much larger public benefits. To reap those benefits, regulators must avoid resting on their laurels by simply fine-tuning existing plans. What is called for are bold *new* steps to further regulatory reform.

This paper presents a vision of where regulation should be 5 years from now. Because of inevitable procedural delays, progress must begin immediately if this goal is to be achieved. The vision provides a compass for evaluating shorter-run reforms. We also suggest some specific short-run reforms that would significantly move regulation in the direction of our long-run vision.

A. Growth in Competition

Any plan for regulatory reform should anticipate and facilitate changes in the market by providing appropriate regulatory flexibility. Local telecommunications is currently undergoing profound changes that will revolutionize the industry structure. Removal of state and federal regulatory barriers to entry is fueling growth in competition. Technological and policy developments will strengthen the array of competing services. Competing access providers (CAPs), cable and wireless services industries are already thriving and hold excellent prospects for the future.

CAPs have for some time succeeded in bypassing local exchange carriers (LECs) by directly connecting private facilities to long-distance carriers. Now, by taking advantage of new interconnection opportunities, they can offer switched access and local services as well. With their established presence in most major markets and their substantial financial resources, CAPs are poised for large-scale, head-on competition with LECs.

Competition from the cable industry will also intensify in the near future. The number of homes passed and number of homes served by the cable industry have both grown rapidly. Cable now has a large presence in residential areas. Increased use of fiber in cable networks positions the cable industry to provide local exchange services at low incremental cost. The recent spate of proposed mergers and other joint arrangements between LECs and cable companies portends an acceleration of competition jointly by cable companies and out-of-region LECs.

The wireless industry will soon bring a vast new universe of competition to local services. The rapid growth of cellular telephony demonstrates the popularity of mobile communication. Advances in digital technology will allow additional capacity for increased traffic. The FCC has adopted a policy of expediting Personal Communication Service (PCS) deployment, and recently decided to increase the spectrum available for wireless technology by four-fold. These and other developments (*e.g.* Motorola's sale of spectrum to Nextel) will drive down the price of wireless service and equipment. We expect that within 10 years, wireless services will provide reasonably-priced alternatives to LEC landline services. The entire landscape of the telecommunications industry will be transformed as a result.

In sum, LECs will face increasingly potent competition. Growth of local-services competition is likely to far outpace the early growth of long-distance competition.

B. Efficiency Incentives

Effective plans for reform also must take into account the incentives for efficiency under different regulatory scenarios. Under traditional rate of return regulation, the company is allowed an opportunity to earn a "fair" return on operations. While providing some benefits, this method of regulation significantly dilutes the firm's incentives to be efficient. Increased efficiency often requires difficult changes in established business and personnel patterns. Without a sufficient financial incentive, such changes are unlikely to be made. Our measurements indicate that rate-of-return regulation (with a one-year lag) affords only a small percentage (about 14 percent) of the efficiency incentives that exist in unregulated competitive markets. Greater incentives can be provided through alternative regulatory approaches.

1. Price Regulation

a. Current price caps

Direct price regulation is one alternative approach to rate-of-return regulation. Price regulation plans currently in operation typically last only 3 to 5 years. The aggregate price level (for services not subject to streamlined regulation) is limited by a price freeze or a predetermined formula. The allowable price level changes each year, in accordance with the formula. However, the formula itself does not change during the term of the plan. Price-regulation plans benefit customers through lower rates during the plan's term (i.e., the consumer dividend). However, renegotiations at the end of the plan term substantially dilute efficiency incentives. Moreover, the shorter the term of the plan, the more are incentives diluted. In addition, some current price-cap plans incorporate a sharing mechanism whereby prices are adjusted on the basis of the firm's earnings. Such plans are hybrids between "pure" price caps and rate-of-return regulation. Such mechanisms further dilute incentives and are counterproductive. We estimate that current FCC hybrid price-cap plan for LECs provides *less than* 35 percent of the efficiency incentives that exist under unregulated competition. Marginal efficiency incentives in the hybrid plan are only about 18 percent for a LEC whose earnings are in the sharing zone each year.

b. Potential improvements

While current price-cap and hybrid plans are somewhat better than rate-of-return regulation, substantial further improvement is possible and desirable. There should be no earnings sharing mechanisms, and the term of the plan should be lengthened to 8 to 10 years. Such a term optimizes the trade-off between the higher risk of a long-term plan and the diluted incentives of a short-term plan. Significantly more incentives for efficiency could be preserved with these improvements than under current plans.

2. Streamlined Regulation in Selected Markets

Streamlined regulation in selected markets is another alternative approach to regulation. Under streamlined regulation, the firm must file tariffs. However, regulators do not (in practice) regulate the firm's prices or earnings. Streamlined regulation provides the full efficiency incentives of competition. Competitive and market pressures are relied upon to limit market power of any firm.

The standard for streamlining regulation in a market should be whether customers who constitute a sizable fraction of demand have reasonable alternatives. This standard is superior to a test of market share, which has limited value as an index of market power, and may create perverse incentives for providers.

Efficiency benefits are maximized when regulation in all appropriate markets is streamlined. To that end, LECs should be allowed to disaggregate services to create additional candidates for streamlining. Discretionary services, including new services that supplement existing services, should be under streamlined regulation. Consumers can check abuse of market power by cutting back purchases of discretionary services if prices are raised or quality declines. Balancing efficiency incentives versus risk, we estimate that the pricing formula (for services not subject to streamlined regulation) should be renegotiated, if necessary, every 8 to 10 years.

Some LEC markets (*e.g.*, special access in some markets, primarily in large metropolitan areas) should already be deregulated or subject to streamlined regulation. Regulation of much of the transport market should be streamlined shortly after collocation is implemented. Over the next several years, as competition becomes much more intense, deregulation or streamlined regulation should apply to a sizable portion of LEC revenues.

C. Impacts of Inefficient Pricing

Future regulatory policy should mitigate the perverse effects of inefficient pricing schemes that have been imposed by regulators in the past. These inefficient pricing schemes, while perhaps useful in the past, are currently poor public policy. Their impact will become increasingly counterproductive as competition intensifies during the next decade.

Inefficient pricing has been promulgated in two ways. One is through overpricing of long-distance services (including long-distance access) in order to underprice local services. This arrangement was implemented to achieve the goal of universal service. That goal has long been achieved. Consequently, interstate access rates should no longer be burdened with an inappropriately high level of support. Access rate reductions benefit a broad base of consumers as long-distance rates are lowered. Lower long-distance access rates which reflect actual cost of access would stimulate use of long-distance service and benefit consumers. Efficiency improvements would be enormous. Additionally, inefficient pricing has the drawback of encouraging entry of inefficient competitors. Even inefficient competitors can easily undercut access rates that are padded by regulators to include noneconomic costs. Access rates should be restructured before competitors, attracted by current inefficient prices, make sizable investments. However, restructuring should follow a transition plan that is both economically and politically acceptable. That plan should incorporate a mechanism for contributions by competitors toward funding the inefficient pricing regime.

The other form of inefficient pricing is underdepreciation of plant. In high-tech industries, plant value declines rapidly due to rapid obsolescence of high-tech equipment. However, regulators have not allowed telephone companies to depreciate plant in pace with the rapid decline in plant value. As a result, unregulated high-tech firms have much more accelerated depreciation than telephone companies. The problem of underdepreciation has not abated in recent years. On the contrary, it has been exacerbated slightly under current price-cap regimes. Regulators and companies should agree on an accelerated schedule for reducing the regulatory book value of assets as part of a revised price-cap plan. Because the devaluation of assets would reduce reported earnings, regulators would *(ceteris paribus)* need to make concessions elsewhere in the plan.

D. Pricing Flexibility

Prices of services not subject to streamlined regulation will presumably have an overall constraint. The LECs' freedom to restructure rates *within* that constraint will affect performance. Additional pricing freedom can yield additional benefits. Because the firm itself is most knowledgeable about actual costs and market conditions, it is best able to set rates efficiently. Recent economic analyses establish that, in the long term, a firm subject only to an overall pricing constraint will tend to price efficiently. However, there may still be a call for some limiting of pricing flexibility. Regulators may want to impose rules to reduce barriers to competitive entry. They may also seek goals other than efficient pricing. For example, regulators may seek moderation of politically sensitive rates, such as for low-income residential customers, even at the expense of economic efficiency.

Price caps can best protect the several public policy goals of regulation by segregating categories of services into relatively few "baskets" which are defined primarily by degree of competition. Each "basket" should be subjected to an appropriate level of regulation. To maximize efficiency, the "baskets" should undergo annual review, to ensure that services are categorized appropriately, as competitive conditions change. Each year, regulation would be streamlined in additional markets, as competition intensifies.

E. Vision of Future Regulation

The preceding analysis leads to our vision of where regulation should be in 5 years; *viz*:

1. In markets where customers have reasonable alternatives to the regulated firm's services, the services are deregulated or regulation is streamlined. In those markets, the firm's prices and earnings are not, in practice, regulated. A process is in place for quickly streamlining regulation in additional markets, as competitive alternatives evolve. Within 10 years, a sizable portion of local exchange markets are subject to streamlined regulation or deregulation.

2. Services not subject to streamlined regulation are governed by price regulation — not traditional rate-of-return regulation. During the term of the plan, the

regulated firm's prices are not tied to its earnings. The pricing formula is renegotiated, if necessary, 8 to 10 years in the future.

3. Regulatory policies that promote inefficient pricing have been phased out to the extent possible. Regulators do not attempt to hold long-distance prices artificially high in order to underprice local services. Depreciation policies ensure that the book value of plant approximates its economic value.

4. Regulated firms have substantial flexibility to set individual prices, subject to a few overall constraints. Price-cap constraints limit the overall level of prices.

Policymakers must start now to implement these policies over the next few years if the United States is to be well-positioned to lead the world into the Information Age. If policy-makers delay even a few years in getting started — and then face lengthy procedural delays — the required changes will involve substantial dislocations. Unnecessary costs will be incurred, and the nation's technological progress will be retarded.

APPENDIX

MEASUREMENT OF EFFICIENCY INCENTIVES

In this Appendix, we develop a method for measuring the efficiency incentives embodied in price-cap plans of various durations. We first discuss the general model and express it in the form of equations. The final section of the Appendix discusses our estimates of model parameters.

General Model

We use the standard procedure of adjusting for inflation and expressing all dollar quantities in real terms. We assume that the firm, in making decisions, discounts future cash flows at a real discount rate d. Thus, cash received j years in the future is weighted by the discount factor $(1\text{-}d)^j$. The discount factor d is the firm's real cost of capital (*i.e.*, the nominal opportunity cost of capital less the rate of inflation), assuming that the firm attempts to maximize the firm's value in financial markets.

We assume that efficiency improvements last m years. That is, efficiency improvements made in the first year last through the *mth* year. *Ceteris paribus*, the firm's efficiency in this model would decline after the *mth* year, when the benefits of the first year's efficiency improvements lapse. However, efficiency improvements made in year m may be large enough to allow overall efficiency to continue increasing over time.

We assume that the firm grows at a rate g We further assume that the benefits of efficiency gains grow proportionally with the size of the firm. Suppose, for example, that an efficiency improvement lowers unit cost. We assume that the lower unit cost applies to the firm's total output for the next m years — not just the level of output in the first year. This assumption implies that an efficiency improvement which yields benefits of 1 in year 1 will yield benefits of $(1+g)$ in year two, $(1+g)^2$ in year 3, etc.

Equations

To develop our measure of efficiency incentives, we assume the efficiency improvements occur throughout the period. We choose units so that efficiency gains are 1 in the first period. We assume that new efficiency improvements in the *ith* period equal $(1 + g)^{i-1}$ for $i \leq m$. These new gains are over and above the continuing gains from efficiency improvements made in previous years.

The present discounted value of all the efficiency gains is

$$\sum_{i=1}^{n} \sum_{k=0}^{m-1} [(1 + g)\ (1 - d)]^{i+k-1} \qquad (1)$$

where,

n = the term of the price-cap plan, and

k = the number of years after a particular efficiency improvement is made.

In an unregulated, competitive market, these gains would all be retained by the firm.

Pure Price Regulation

Under limited-term price caps, the gains retained by the firm are truncated. They are as follows for pure price regulation:

$$\sum_{i=1}^{n} \sum_{k=0}^{h} [(1 + g)\ (1 - d)]^{i+k-1} \qquad (2)$$

where,

h = the minimum of $\{m - 1, n - i\}$

In Equation (2), the firm gets to keep the efficiency gains until they lapse or until the end of the price-cap period — whichever comes first.

In this formulation, we conservatively assume that regulators fully understand and adjust for the lapsing of efficiency gains. In reality, that may not be the case. For example, suppose a firm is subject to one-year price caps (or equivalently, the FCC mode of ROR regulation). Suppose that the firm makes a one-time cost saving ($m = 1$). The regulator, observing the lower costs due to a nonrecurring event, could conceivably lower rates in the second year. Since the one-time efficiency gain has lapsed, the firm does not cover its costs in year 2. Indeed, the firm's losses in the second year would essentially cancel out the gains in the first year. The overall result is that the firm has no incentive to undertake the one-time cost-saving measure.

In our formulation, we assume that regulation is not administered in this short-sighted manner and that the firm keeps the efficiency gains during the term of the plan, with no penalty after the plan ends. More generally, our measure of efficiency incentives is conservative to the extent that regulators do not fully adjust for the lapsing of efficiency gains. That is, our method *overestimates* the efficiency incentives for limited-term price-cap plans.

Our efficiency measure is the ratio of Equation (2) to Equation (1); *i.e.*

$$\frac{\sum_{i=1}^{n}\sum_{k=0}^{h}[(1+g)(1-d)]^{i+k-1}}{\sum_{i=1}^{n}\sum_{k=0}^{m-1}[(1+g)(1-d)]^{i+k-1}} \qquad (3)$$

It is the ratio of the efficiency incentives under price caps relative to those provided by unregulated competitive markets.

Assuming that $d > g$, Equation (3) approaches unity for large n. Thus, indefinite-term price caps provide the same maximal incentives that are provided in an unregulated competitive market.

Equation (3) is less than unity for all finite n. That is, all limited-term price-cap plans provide weaker efficiency incentives than supplied by unregulated competitive markets.

Price Caps with a Sharing Mechanism

Many price-cap plans have a sharing mechanism. Under such mechanisms, prices are usually adjusted upward or downward, each year, depending on the firm's earnings the previous year. Sharing generally applies only when the firm's rate of return is within certain ranges.

In our model, we assume that the firm is in the sharing range, and we consider marginal efficiency improvements. Each year after the first, prices are reduced by the marginal efficiency gain times the sharing fraction The efficiency gains retained by the firm are:

$$\sum_{i=1}^{n}\sum_{k=0}^{h}[(1+g)(1-d)]^{i+k-1} - s\sum_{i=1}^{n}\sum_{k=0}^{h}[(1+g)(1-d)]^{i+k} \qquad (4)$$

where,

s = the sharing fraction.

Since sharing occurs the year after the efficiency gains occur, the adjustment incorporates an extra year of growth and discounting. Hence, the experiment is $i+k$, not $i+k-1$.

The ratio of efficiency gains under price caps with sharing to those under unregulated competition is:

$$\frac{\sum_{i=1}^{n}\sum_{k=0}^{h}[(1+g)(1-d)]^{i+k-1} - s\sum_{i=1}^{n}\sum_{k=0}^{h}[(1+g)(1-d)]^{i+k}}{\sum_{i=1}^{n}\sum_{k=0}^{m-1}[(1+g)(1-d)]^{i+k-1}} \qquad (5)$$

Estimation of Parameters

Equation (3) contains three parameters that need to be estimated:

1) The firm's real opportunity cost of capital (d);

2) The firm's growth rate (g); and

3) The duration of efficiency improvements (m).

Our procedures for estimating these parameters is discussed below. The estimates are approximate and are intended only to provide broad guidelines for evaluating alternatives for regulatory reform. These estimates suffice to establish our main points that efficiency incentives are far too weak under short-term price-cap plans and that the problem gets worse if there is an additional sharing mechanism.

The Firm's Real Cost of Capital

We use the FCC's target ROR for ROR LECs less the inflation rate as a reasonable proxy for the firm's real cost of capital. The FCC reset the LECs' target ROR to 11.25 shortly before instituting price caps for LECs. At that time, the inflation rate, measured in terms of the GNPPI, was slightly above 4 percent per year. The difference between the allowed ROR and the inflation rate was about 7 percent per year. That is our estimate of the firm's real opportunity cost of capital.

Growth Rate

We use the growth rate of interstate switched access minutes as our proxy for the firm's growth. This is a reasonable measure, as applied to interstate regulation of LECs. Different growth rates would be appropriate for application to state regulation.

We use the annual rate of growth from 1989 to 1992. Earlier years are less indicative of future growth, since the industry was not under price caps, and switched access prices were rapidly declining because of imposition of the Subscriber Line Charge.

Growth of interstate switched access minutes was between 6 and 7 percent per year from 1989 to 1992. At the same time, real price declines of 3.3 percent were guaranteed by the price-cap plan. The difference between these two rates (about 3 percent per year) is the growth rate of the *real value* of output. We use that net growth rate in developing our measure of efficiency incentives.

Average Duration of Efficiency Gains

A variety of activities of the firm may improve efficiency. The duration of the efficiency gains varies from activity to activity.

Efficiency gains may relate to the deployment of new technology. The duration of such gains is the economic life of the equipment that embodies the new technology. The economic life of fiber optic cable probably exceeds 10 years. Other equipment that embodies new technology (*e.g.*, digital switches or circuit equipment) have shorter lives; *e.g.*, 5 to 10 years.

Another type of efficiency gain is the introduction of a successful new service. The duration of the gain would be the life of the service. Service lives can be very long. Custom calling was introduced in the 1970s and is still offered today. CLASS services will probably be offered long into the future.

Efficiency may also be improved by redefining job functions of management and/or labor. This may involve retraining personnel, relocating personnel and/or reducing the work force. The efficiency gains from such activities typically last for some time. However, the telecommunications business is rapidly changing, and before too long, jobs will need to be redefined again. Efficiency gains of this type probably last for only 3 to 5 years.

The average duration of the gains from all these diverse activities probably lies somewhere in the range of 5 to 10 years. We use 8 years as a reasonable rough approximation.

Attachment 6

FORM 492
COMPARISON OF RBOCS

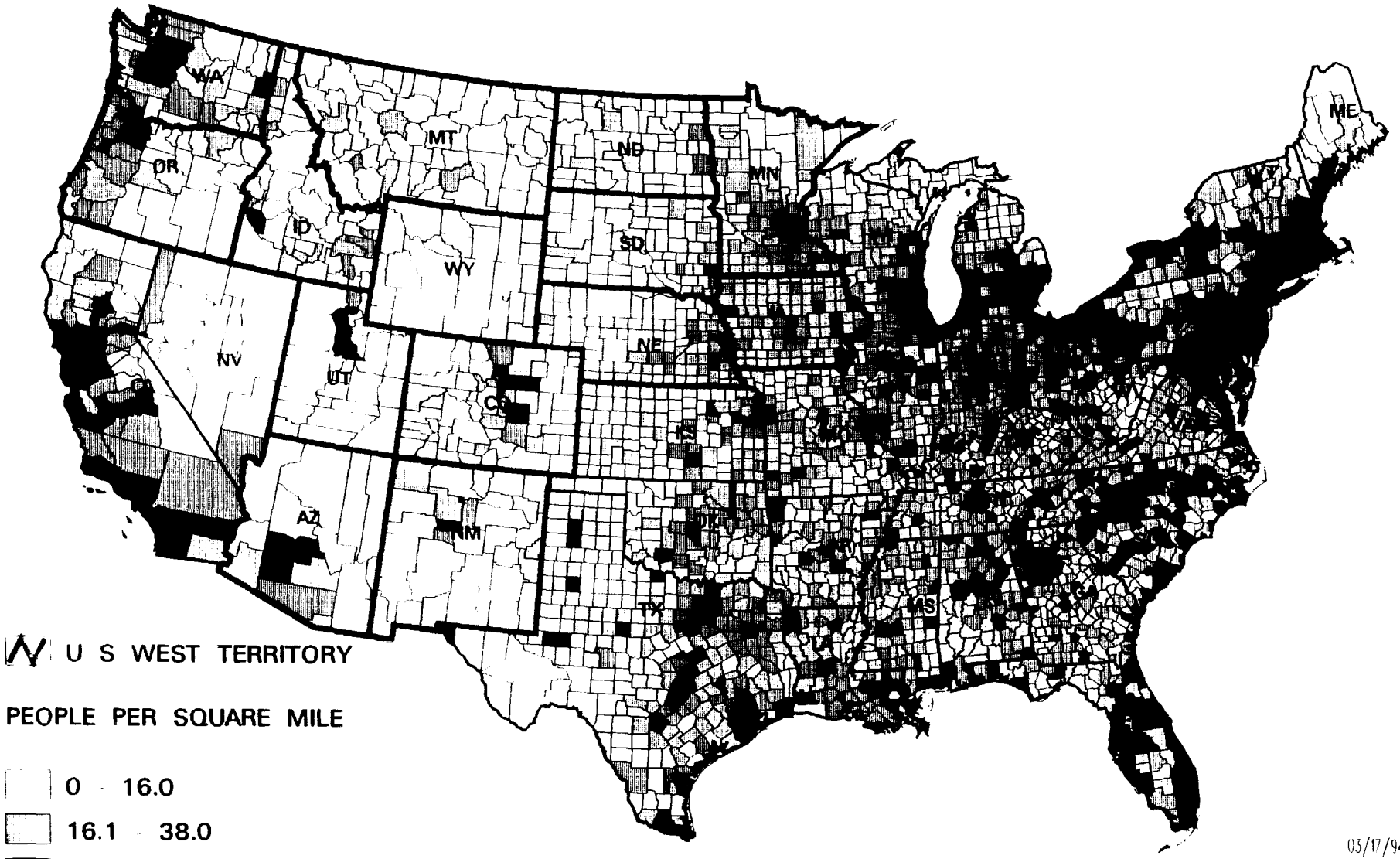
INTERSTATE ACCESS RATE OF RETURN

	Monitoring Period					
	10/1/85 – 12/31/86	1/1/87 – 12/31/88	1/1/89 – 12/31/90	1/1/91 – 12/31/91	1/1/92 – 12/31/92	1/1/93 – 12/31/93 *
Ameritech	12.65%	11.44%	12.21%	13.00%	12.79%	14.80%
Bell Atlantic	12.58%	12.34%	11.11%	12.83%	12.50%	13.89%
Bell South	11.99%	12.75%	12.14%	12.62%	12.80%	13.72%
NYNEX	10.79%	12.01%	11.10%	9.38%	12.50%	12.58%
Pacific Telesis	13.15%	13.63%	12.74%	11.89%	12.73%	13.14%
Southwestern Bell	12.72%	12.32%	11.69%	10.75%	11.80%	12.81%
U S WEST	***12.73%***	***12.64%***	***12.75%***	***12.40%***	***12.41%***	***13.62%***

* Preliminary

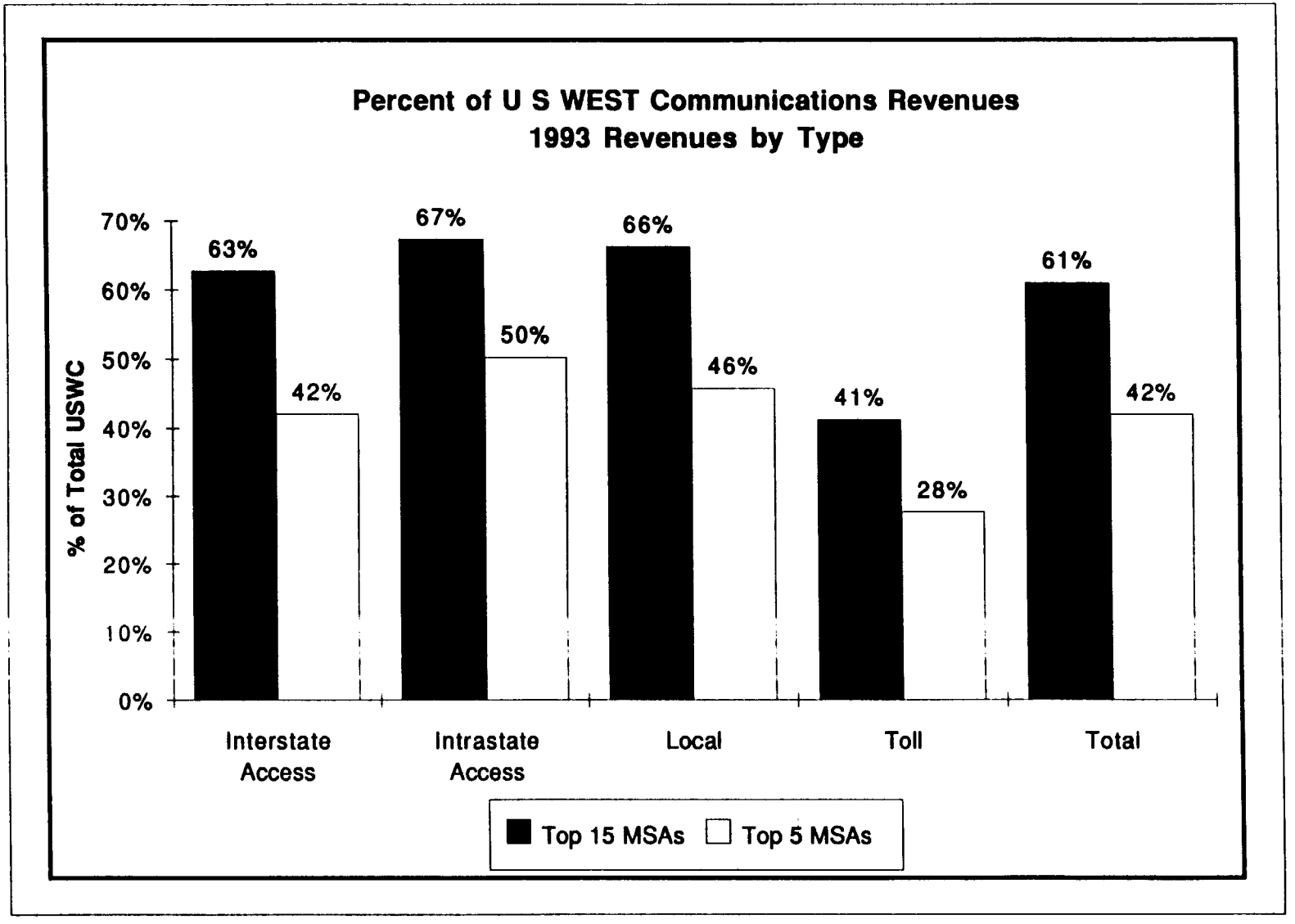
Attachment 7

USA 1990 POPULATION DENSITY BY COUNTY



03/17/94

Attachment 8



Top 15 MSAs	Albuquerque	Denver	Minneapolis-St. Paul	Portland	Seattle
	Boise	DesMoines	Omaha	Salem	Spokane
	Colorado Springs	Eugene	Phoenix	Salt Lake City	Tucson
Top 5 MSAs	Denver	Phoenix	Seattle		
	Minneapolis-St. Paul	Portland			

Attachment 9

Competitive Access Providers in the U S WEST Region[1]

Albuquerque
IntelCom (Planned)

Boulder
IntelCom (Planned)

Colorado Springs
IntelCom

Des Moines
IOR Telecom
MFS

Denver
IntelCom
Teleport of Denver, LTD.
Jones Lightwave

Phoenix
IntelCom

Portland
Electric Lightwave
Fibernet, Inc.

Salt Lake City
Electric Lightwave (planned)
IntelCom, Inc.

Seattle
Advanced Telcom Management
Digital Direct
Electric Lightwave
Fibernet, Inc.
PacNet
Teleport

Minneapolis
MFS

Omaha
MFS
Teleport

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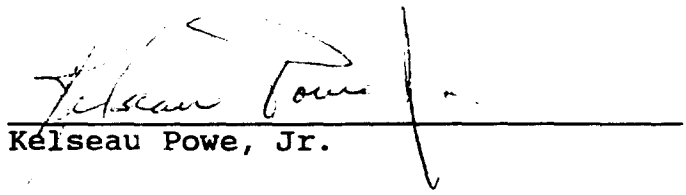
1 See, Peter Huber, The Enduring Myth of the Local Bottleneck, March 14, 1994, Table 1.

CERTIFICATE OF SERVICE

I, Kelseau Powe, Jr., do hereby certify that on this 9th day of May, 1994, I have caused a copy of the foregoing **COMMENTS** to be served via first-class United States Mail, postage prepaid, upon the persons listed on the attached service list.



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Kelseau Powe, Jr.

***Via Hand-Delivery**

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